

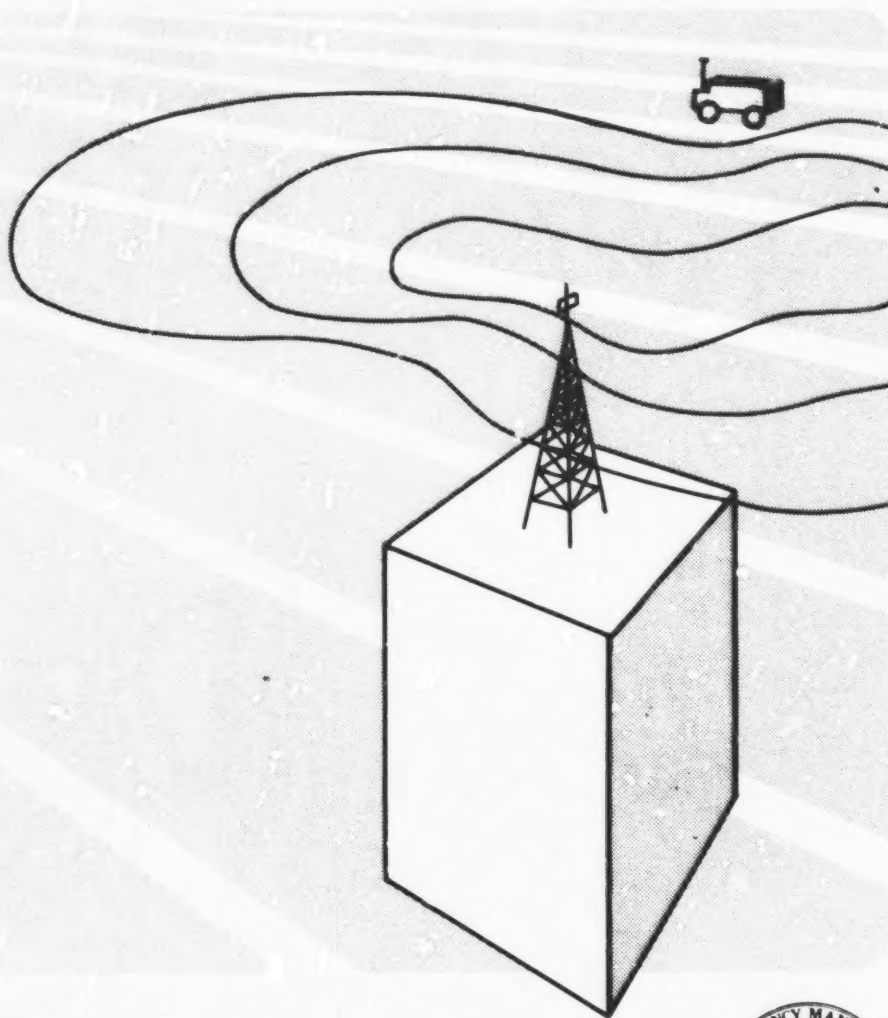
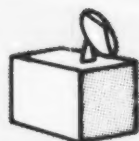
SEP 17 1988

FEM 1.8/2.2-13C

FEDERAL EMERGENCY MANAGEMENT AGENCY

CPG 2-13C / April 1986

Maintenance Manual Antenna Guylines and Mounting



24/VL

COMPLETED

April 2, 1986

CPG 2-13C

MAINTENANCE MANUAL

**ANTENNA GUYLINES
AND MOUNTING**

**Federal Emergency
Management Agency**

Maintenance Manual Antenna Guidelines and Mounting

Introduction

The purpose of this manual is to guide you on how to maintain antenna guidelines and mounting. The information in this manual is only a **supplement** to the recommended maintenance information contained in the manufacturer's service manual. **Always follow the maintenance procedures described in the manufacturer's manual.** This manual will help you understand why maintenance is necessary. This manual will also be helpful if the manufacturer's manual is not immediately available.

Description of Antenna, Guidelines & Mounting

Antennas are metallic rods or wires used to send and receive radio waves. When an antenna receives a radio signal, it converts it to an electrical current that the receiver can process when it is set for receiving. When an antenna sends a radio signal, it converts the electrical impulse from the transmitter into a radio wave.

Antennas are simple devices that appear in a wide variety of shapes and sizes. Nevertheless, they are perhaps the most important part of a fixed radio station's system. The performance of any radio is highly dependent on the radio's antenna to pick up and send signals.

There are many different types of base station antennas depending on the needs of the agency. There are antennas that radiate or receive their signal in only one or two directions, beam, quad, and microwave antennas all of which are designed to more efficiently capture, or radiate certain radio frequencies at the exclusion of others.

Omnidirectional antennas are the most widely used base station antennas, especially for communicating with mobile units in vehicles. **These antennas radiate their signals in all directions equally.** The ground plane antenna is the most common omnidirectional antenna.

The range of radio system is always improved when the antenna is mounted on the highest object in the area, on its own free standing tower, or a combination of the two. Antennas at the frequencies most commonly used (30-450 MHz) send and receive signals in a line of sight, so elevating an antenna improves its range.

Preventive Maintenance

To ensure that your equipment works in an emergency, you should **regularly check the antennas, their connecting cables and their mountings to spot small troubles before they become big problems.** Monthly, semiannual, annual, and biennial maintenance checks prevent serious problems from suddenly happening.

Routinely examine the equipment. Check for frayed connections and loose nuts and bolts. These checks are not normally mentioned in manufacturer's manuals, but can lead to more serious problems.

Equipment and Spare Parts

Only ordinary mechanical and electrical tools are necessary to keep your equipment in top shape. To perform some maintenance tasks, you may also need an ohmmeter and a rf through-line watt meter.

Fixed station antennas require few spare parts. Because antenna systems are so inexpensive, it is often quite reasonable to replace the entire unit rather than waste time trying to isolate a problem. The following table lists the spare parts that one agency has on hand for a fixed station antenna.

Parts on hand for a fixed station antenna

<u>Names of parts</u>	<u>Quantity</u>
complete replacement antenna (depending on cost & size)	1
recommended connector	1
assorted nuts & bolts	

Safety

Antennas carry high voltages. Do not inspect the transmission line when the transmitter is operating. Do not work near an antenna when the transmitter's power is on. Particularly avoid the area around the antenna coupler. Contact can be fatal and/or inflict severe burns. Only a qualified electronics technician should attempt to repair any serious electrical problems. **Climb antenna towers with extreme caution. Never climb on an antenna; it will not support you.** Follow safety precautions outlined in maintenance manuals provided by the manufacturer.

Monthly Maintenance Checks

1) **Inspect lighting system on antenna tower, if lights are required for your tower by FCC regulations.**

6-Month Maintenance Checks

1) **Apply anticorrosion silicone compound on threaded areas of section and insulating extensions as needed.**

2) **Check insulators for cracks and dirt. Clean or replace as necessary.**

12-Month Maintenance Checks

1) **Visually Check all connections for continuity.**

2) **Check routing cable for signs of disrepair. Replace if necessary.**

3) **Inspect all electrical fixtures, if lighting of antenna tower required.**

4) **Inspect ground wire and its connectors to the antenna tower for damage due to lightning.**

5) **Inspect tower guys for corrosion. Replace only if zinc coating on the guys has been removed and the steel wire itself is being attacked.**

6) **Check and adjust as necessary tautness of guy wires.**

7) **Examine all bolts. Tighten where necessary.**

8) **Check climbing facilities on tower. Step bolts are used on short towers, ladders on taller structures.**

24-Month Maintenance Checks

1) **Clean the antenna. Remove dirt, grease and fungus that could affect the efficiency of the antenna.**

2) **Connect a through-line watt meter in series between the transmitter/receiver and the antenna. Key the transmitter and measure the forward and reflected power. Use initial VSWR as base line measure to determine if any degradation of signal strength has occurred.**

3) **Paint tower as necessary to maintain visibility, or as required by FCC.**

4) **Check to make sure that the tower is vertical.**

Corrective Maintenance: Troubleshooting

Some equipment malfunctions may be discovered during the operation or maintenance of the equipment. You should perform the tests on the following table to correct the problem.

PLEASE NOTE: This manual does not attempt to list all possible malfunctions that could occur nor can we suggest all possible remedies. Consult the manufacturer's manual if a malfunction is not listed or it is not corrected by prescribed procedure.

Corrective Guidelines: Antenna Guidelines & Mounting

Malfunction	Possible Cause	Recommendation
1. Short transmit range: noisy reception	■ defective antenna system	■ disconnect antenna and insert test lead probe into antenna receptacle (DO NOT KEY TRANSMITTER)
	■ broken connection	■ if reception improves, check antenna system
	■ wrong antenna for band used	■ check all connections between radio and antenna ■ replace antenna with correct model; re-tune circuits of the unit
2. Short transmit range: normal	■ antenna system mismatch	■ connect in-line rf watt-meter in series with antenna; measure voltage standing wave resistance (vswr) & adjust transmitter for minimum vswr ■ if vswr cannot be reduced to less than 1.3:1, replace antenna or coaxial cable